

REMARKS

Claims 1-27 are pending in this application.

Specification Objection

The specification has been amended to insert the abstract on a separate sheet in accordance with 37 CFR 1.52(b)(4). Reconsideration and withdrawal of the objection is respectfully requested.

Claim Rejections

Non-statutory double patenting rejection

A. Response to Rejection of Claims 1-14 and 19 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-7 and 11-17 of U.S. Patent No. 5,849,653 of Dall'Occo et al. ("Dall'Occo I").

The Examiner states that, although the conflicting claims are not identical, claims 1-14 and 19 of the application are not patentably distinct from the claims 1-7 and 11-17 of Dall'Occo I because the scope of these two sets of claims overlaps with each other. Applicants respectfully submit that the organometallic aluminum compounds of instant claims 1-27 represent a novel subclass of compounds belonging to the general formula claimed by Dall'Occo I.

The present invention relates to a catalyst system based on metallocene compounds particularly suitable for the polymerization of olefins, said catalyst system comprising the product obtained by contacting the following components (page 23, claim 1):

- (A) a metallocene complex of formula (I);
- (B) an organometallic aluminum compound having formula $\text{Al}[\text{CH}_2\text{-C}(\text{Ar})\text{R}^4\text{R}^5]_x\text{H}_y$;
- (C) water;

the molar ratio between the organometallic aluminum compound (B) and the water being between 1:1 and 100:1.

As shown in the working Examples, the claimed catalyst system gives a particularly high activity when used in the polymerization of olefins. This catalyst system increases the polymerization yield with respect to the metallocene catalysts known in the art.

US 5,849,653 discloses catalytic systems for the polymerization of olefins comprising the product obtained by contacting the following components:

- (A') a cyclopentadienyl compound having substantially the same structure of the component (A) of the present invention when the group A of formula (I) of the instant claims has the same meaning of C_p;
- (B') organometallic aluminum compounds having formula $\text{Al}(\text{CH}_2\text{-CR}^4\text{R}^5\text{R}^6)_w\text{R}^7_y\text{H}_z$ (col. 2, lines 58-67 and col. 3, lines 1-7);
- (C') water.

The organometallic aluminum compound disclosed by Dall'Occo I includes a vast class of organometallic aluminum compounds of formula $\text{Al}(\text{CH}_2\text{-CR}^4\text{R}^5\text{R}^6)_w\text{R}^7_y\text{H}_z$. In the present invention, applicants have discovered and identified a novel subclass of aluminum compounds, which improves the catalyst yield in the polymerization of olefins.

The organometallic aluminum compounds of the present invention have at least two groups $\text{CH}_2\text{-C}(\text{Ar})\text{R}^4\text{R}^5$ ($x=2$ or 3) which represent a subclass of the compounds belonging to the aluminum compounds $\text{Al}(\text{CH}_2\text{-CR}^4\text{R}^5\text{R}^6)_w\text{R}^7_y\text{H}_z$ as disclosed by Dall'Occo I.

It was found that the catalyst using the presently claimed organometallic aluminum compounds generates unexpected results in term of the catalyst activity and polymerization yields as compared to the catalyst without the aluminum compounds having at least two groups $\text{CH}_2\text{-C}(\text{Ar})\text{R}^4\text{R}^5$.

The following aluminum compounds have been tested for the polymerization of olefins by Dall'Occo I:

- (1) tris (2,4,4- trimethyl-pentyl)aluminum [TIOA] in Ex. 1, 12, 14, 17, 21 (see Tab. 1-4)
- (2) bis (2,4,4- trimethyl-pentyl)aluminum hydride [DIOAH] in Ex. 2, 3, 15, 18, 22;
- (3) 2-phenyl-propyl-modified-DIBAH [M^1 -DIBAH] in Ex. 8, 25, 31;
- (4) 2-phenyl-propyl-modified-DIBAH [M^2 -DIBAH] in Ex. 9, 10, 11, 32;
- (5) 1-butene-oligomers-modified-DIBAH [M^3 -DIBAH] in Ex. 26, 27, 28;
- (6) 1-butene-oligomers-modified-DIBAH [M^4 -DIBAH] in Ex. 29;

The structural formulae of the compounds (1), (2), (5) and (6) do not possess any aryl group, and although the compounds (3) and (4) contain a phenyl group, they have only a single CH₂-C(Ar)R⁴R⁵ group, whereas claim 1 of the present invention requires at least two of said groups (x=2 or 3). Therefore, all of the specific compounds cited in the examples and the specification of Dall'Occo lie outside the scope of the present claims.

As shown in Table 1 of the present application, the catalyst activity and the polymerization yield of the cocatalyst containing at least two CH₂-C(Ar)R⁴R⁵ groups (Examples 1-13) are much higher than the cocatalyst containing no CH₂-C(Ar)R⁴R⁵ group (Comp. Examples 1-6) or the cocatalyst containing only one CH₂-C(Ar)R⁴R⁵ group (Dall'Occo I, Table 1-4, Examples 8, 9, 10, 11, 25, 31 and 32).

Therefore, the catalyst system disclosed in the present invention shows unexpectedly favorable results in terms of the catalyst activity and polymer yield for the olefin polymerization. Reconsideration and withdrawal of the rejection is respectfully requested.

B. Response to Rejection of Claims 15-18 and 20-27 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-5 and 9 of U.S. Patent No. 6,136,932 of Dall'Occo et al. ("Dall'Occo II").

The Examiner states that, although the conflicting claims are not identical, the claims 15-18 and 20-27 of the application are not patentably distinct from the claims 1-5 and 9 of Dall'Occo II because the scope of polymerization process overlaps with each other. Applicants respectfully submit that since the organometallic aluminum compounds of instant claims 1-27 represent a novel subclass of compounds which are patentably distinct, the polymerization process is also patentably distinct from the process claimed by Dall'Occo II.

As discussed above, the prior art reference does not recite in the specification or examples any organometallic aluminum compounds containing at least two CH₂-C(Ar)R⁴R⁵ groups as described in the present claims. Further, the unexpectedly high catalyst activity and polymer yield in the olefin polymerization using the catalyst system of the present invention, demonstrates that it is patentably distinct from the claims of the cited reference. Reconsideration and withdrawal of the rejection is respectfully requested.

Rejection Under 35 U.S.C. § 102

A. Response to Rejection of Claims 1-27 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Nos. 5,849,653 of Dall'Occo et al. (Dall'Occo I) and 6,136,932 of Dall'Occo et al. ("Dall'Occo II").

The Examiner rejects the claims 1-27 under 35 U.S.C. § 102(b) as being anticipated by Dall'Occo I and II. The Examiner has acknowledged that the catalyst system claimed in the present invention is not identical with those disclosed in the prior art references. Applicants further submit that the formula cited in the prior art references is so general as to encompass a vast number of compounds. In view of the large group of compounds disclosed by the formulae of the references and the fact that the cited references do not specifically teach any compounds falling within the formula of the present invention containing at least two CH₂-C(Ar)R⁴R⁵ groups, one skilled in the art would not be able to at once envisage the compounds of the present invention (MPEP 2131.02). Reconsideration and withdrawal of the rejection respectfully is requested.

Applicants submit that the application stands in condition for allowance. Should the Examiner have questions or comments regarding this application or this amendment, Applicant's attorney would welcome the opportunity to discuss the case with the Examiner.

The Commissioner is hereby authorized to charge U.S. PTO Deposit Account 08-2336 in the amount of all fees required for consideration of this Amendment.

This is intended to be a complete response to the Office Action mailed March 1, 2004.

Respectfully submitted,

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August 2, 2004
(Date)

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Enclosures

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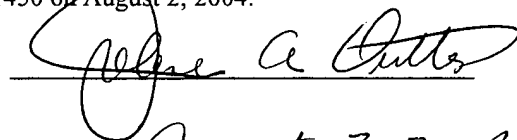
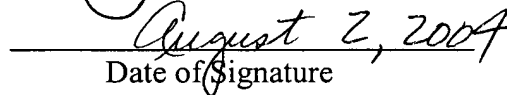
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I hereby certify that this correspondence is being deposited with sufficient postage thereon with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on August 2, 2004.

A handwritten signature in cursive script, appearing to read "John A. Butts", is written over a horizontal line.A handwritten date "August 2, 2004" is written over a horizontal line. Below the line, the words "Date of Signature" are printed.